STATE OF ALASKA

Jay S. Hammond, Governor

Annual Performance Report for

INVENTORY OF HIGH QUALITY RECREATIONAL FISHING WATERS IN SOUTHEAST ALASKA

by

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RESEARCH PROJECT SEGMENT

State: ALASKA Name: Sport Fish Investigations of Alaska

Project No.: F-9-13

Study No.: G-I Study Title: INVENTORY AND CATALOGING

Job No.: G-I-R Job Title: Inventory of High Quality Recreational Fishing Waters in Southeast Alaska

Cooperator: Artwin E. Schmidt

Period Covered: July 1, 1980 to June 30, 1981

ABSTRACT

Limnological relationships existing in ten lakes were investigated. Two of the lakes (Mountain and Situk) were sampled intensively every third week. Akwe Lake was sampled twice. All other lakes were visited only once during the summer. Recreational analyses were conducted on all systems.

Analyses of physical and chemical parameters indicates that Mountain and Situk Lakes are the second and third most productive of lakes studied to date in southeast Alaska. Morphoedaphic index of these lakes is 2.88 and 2.20, respectively. Akwe Lake had a morphoedaphic index of 0.56. Specific conductance of Situk Lake (105 micromhos) and Mountain Lake (100 micromhos) are the highest encountered to date in southeast Alaska lakes. Akwe, a glacial lake with specific conductance of 48, had unusually high iron content (632 micrograms per liter).

The Situk system is, in terms of fish, the most productive of its size in southeast Alaska. This is one of the most popular sport fishing systems in the state.

BACKGROUND

Limnological investigations have been conducted in several lakes in southeast Alaska (Schmidt, 1974; Schmidt and Robards, 1975; Schmidt, 1976, 1977, 1978, 1979). One continuing objective of this project is to determine the relationship of physical, chemical, and biological characteristics to fish production.

The Alaska Department of Fish and Game (ADF&G), Sport Fish Division, has long attempted to obtain additional protection for high-quality fishing waters. In 1972 ADF&G made an official request to the forest supervisor of the Tongass National Forest to give special consideration to identified high-quality watersheds.

This investigation was conducted to further quantify the recreational value and productivity of lake systems. Selected lakes included Situk, Mountain, and Akwe near Yakutat. Less intensive investigations were conducted on Square Lake, Hart Lake, Aka Lake, Summit Lake, Boat Harbor Lake, Pike Lake, and Lake No. 3 (Figure 1). Table 1 lists common and scientific names of fish encountered.

RECOMMENDATIONS

A Sport Fish biologist position should be established in Yakutat. The area is growing in importance as a sport fishing area, and local guides are expanding their operations to lake and river systems we know very little about. The already popular Situk is getting more angler pressure every year for salmon and steelhead trout. This system needs some population work and harvest data done soon in order to preserve the quality of the fishery and the resource. Specific recommendations include:

1. Manage the salmon runs in the Situk River system for a higher priority on use by the sport fishery.

2. Investigate new strategies for enumerating Situk steelhead trout populations, so that spring and fall run components can be separated and better enumerated.

3. Continue coho salmon creel census for in-season management and begin in-season census and management for Situk River chinook salmon.

4. Study the economic impact of the sport fishery on the Yakutat area.

OBJECTIVES

1. To determine the relationship of physical, chemical, and biological characteristics of Situk, Mountain, and Akwe lakes. Productivity potential of these lakes will be related to fish production and compared with other lakes in southeast Alaska.

TECHNIQUES USED

Relationship of Limnological Characteristics to Fish Production

Limnological relationships existing in ten lakes were investigated. Two of the lakes (Mountain and Situk) were sampled intensively every third week. Akwe Lake was sampled twice. All other lakes were visited only once during the summer.

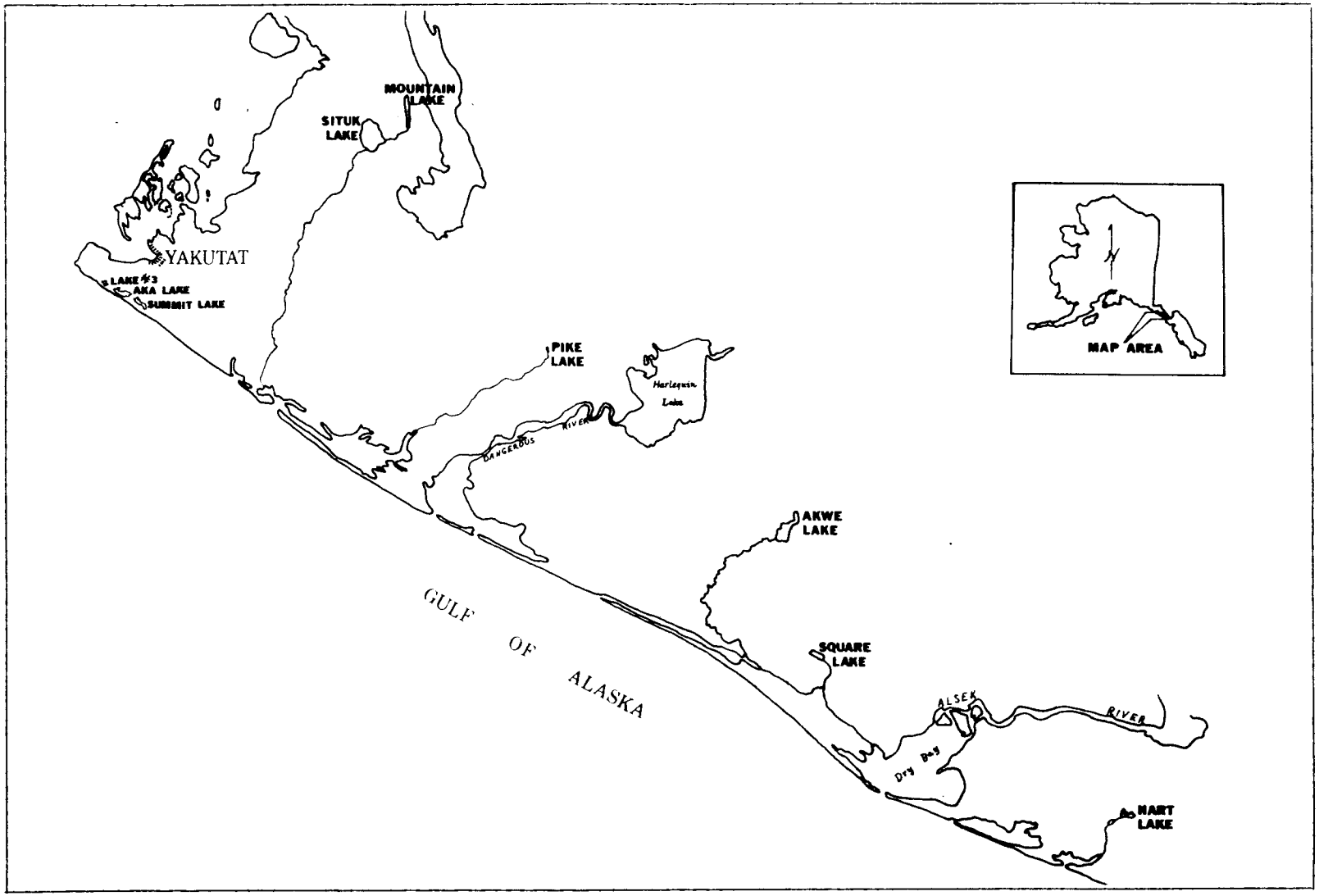

Fig. 1. Location of lakes studied in Yakutat area, 1980.

Table 1. List of common and scientific names.

Common Name	Scientific Name and Author	Abbreviation
Rainbow Trout	*Salmo gairdneri* Richardson	RT
Dolly Varden	*Salvelinus malma* (Walbaum)	DV
Sockeye Salmon	*Oncorhynchus nerka* (Walbaum)	RS
Coho Salmon	*Oncorhynchus kisutch* (Walbaum)	SS
Chum Salmon	*Oncorhynchus keta* (Walbaum)	CS
Sculpin	Cottidae	Sc
Threespine Stickleback	*Gasterosteus aculeatus* Linnaeus	TSB
Chinook Salmon	*Oncorhynchus tshawytscha* (Walbaum)	KS
Pink Salmon	*Oncorhynchus gorbuscha* (Walbaum)	PS
Steelhead	*Salmo gairdneri* Richardson	SH
Cutthroat Trout	*Salmo clarki* Richardson	CT
Arctic Grayling	*Thymallus articus* (Pallas)	GR
Northern Pike	*Esox lucius* Linneaus	NP

Sampling stations were established at approximately the deepest portion of each lake. Vertical profiles of temperature and specific conductance were recorded at each station. Water samples for comprehensive chemical analyses were collected and preserved at each station. Field chemical analyses, including alkalinity titrations, were conducted according to Standard Methods (1971). Comprehensive chemical determinations on preserved samples were conducted by the ADF&G limnological laboratory using atomic absorption and gas chromatographic analyses.

Bathymetric maps were prepared for each lake. A recording fathometer was used to record depth contours on transects crossing each lake. The depth contours were transferred to bathymetric maps, and morphometric data were calculated from these maps.

Zooplankton were collected every 3 weeks by making duplicate vertical tows. The net used was 0.5 m diameter and 3 m long. Straining cloth had aperture of 153 microns and 45% open area. Plankton were identified and counted. Dry and ash weight of plankton were determined gravimetrically.

Efficiency of nets was not accounted for in calculations. Thermal profiles and Secchi disc readings were taken in conjunction with plankton tows.

Stream drift organisms were collected by placing two nets in the main inlet. Nets used were 30.5 cm square, 91.4 cm long, made with Nitex with pore size of 280 microns and 45% open area. Benthos were preserved and later identified and enumerated in the laboratory.

Bottom fauna were collected by dredging with an Ekman 152.4-mm dredge. Bottom samples were washed through three screens, the finest having 28 meshes per inch. Organisms were preserved in 70% ethyl alcohol or frozen until laboratory analysis.

Adult and juvenile fish were collected by hook and line, gill nets, and fry traps. Age, growth, and food habits of fish in the lakes were determined from fish collected throughout the study period.

Evaluation of High-Quality Recreational Fishing Waters

The recreational potential of each of the lakes was evaluated. Information evaluated included present and future recreational opportunity and importance, proximity to other recreational areas, uniqueness of the area, ability of the system to support a viable fishery, accessibility, and aesthetics.

FINDINGS

Relationship of Limnological Characteristics to Fish Production

Morphometry:

The depth, size, and shape of lakes strongly influence physical and chemical conditions which prevail in them. Since physical and chemical

parameters limit species composition and abundance of organisms, it is essential to study the morphometric features of lakes. Bathymetric maps of Akwe Lake (Figure 2), Mountain Lake (Figure 3), and Situk Lake (Figure 4) were prepared from sounding data. Morphometric data for these lakes are presented in Tables 2 through 4. Maximum depth of other lakes studied are: Aka, 3 m; Boat Harbor, 8.5 m; Lake No. 3, 4.5 m; Pike, 3.5 m; Square, 3.5 m; and Summit, 1.0 m.

Physical and Chemical Considerations:

Observations of temperature, Secchi disc visibility, pH, conductivity, alkalinity and hardness were made on lakes during the survey period. Locations of sampling stations for Akwe, Mountain, Situk, and Square Lakes are shown in Figures 5 through 8. Thermal data from Akwe, Mountain, and Situk Lakes are presented in Table 5. Alkalinity, conductivity, dissolved oxygen, hardness, pH, Secchi disc visibility, and water temperature for all lakes studied are presented in Table 6. Water quality analyses of Akwe, Mountain, and Situk Lakes are presented in Table 7.

The morphoedaphic index (MEI) (Ryder, 1964; 1965) is an empirically-derived formula that was described initially as a convenient method of rapidly calculating potential fish yields from unexploited north-temperate lakes. Since its inception, the constraints on the use of the MEI have been relaxed, as it has been applied to sets of lakes other than those for which it was originally devised. Various investigators have clarified our understanding of the MEI (e.g., Jenkins, 1967; Regier et al., 1971; Henderson et al., 1973) and have extended the application of this index to other climatic systems.

The MEI for all lakes studied so far in southeast Alaska is presented in Table 8. Mountain and Situk Lakes rank as the second and third most productive lakes studied to date. This is attributable to the high total dissolved solid (TDS) content of water. Akwe is quite low because of deep depth and relatively low TDS.

Plankton:

Zooplankton populations were monitored throughout the summer at Mountain and Situk Lakes. Plankton from Akwe Lake was collected only once. Plankton composition and density from all lakes is presented in Table 9. A list of zooplankton species identified from these lakes is presented in Table 10. Zooplankton populations in Akwe Lake were practically nonexistent.

The standing crop of net plankton was calculated using an assumed net efficiency of 25%. Average standing crop (organic weight in kg/ha) of net plankton was Akwe, 0.3; Mountain, 3.2; and Situk 3.2. This shows all lakes to be in the oligotrophic category.

Bottom Fauna:

Bottom fauna collected by dredging and screening benthic material from Mountain and Situk Lakes are identified and enumerated in Table 11.

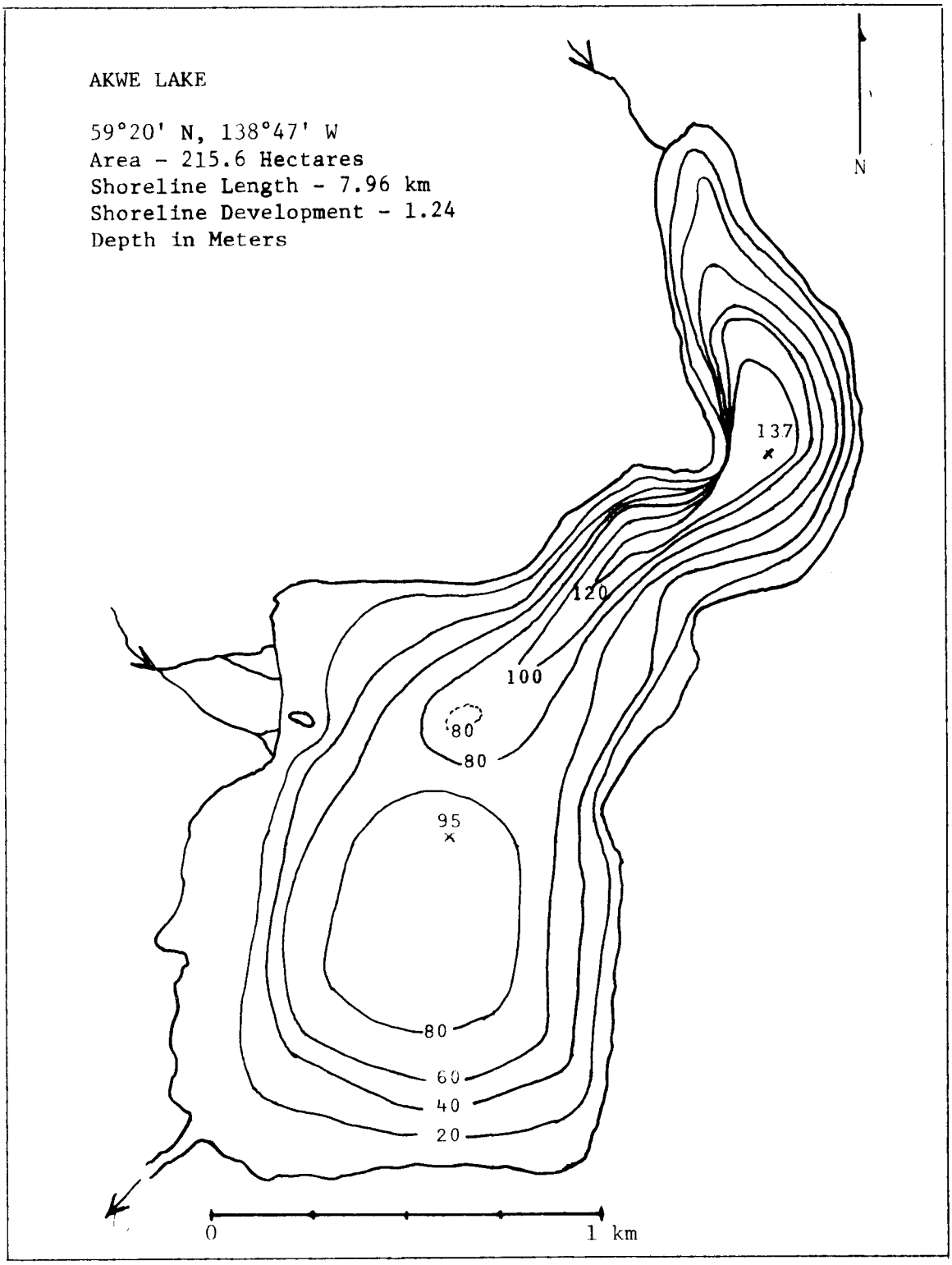

Fig. 2. Bathymetric map of Akwe Lake.

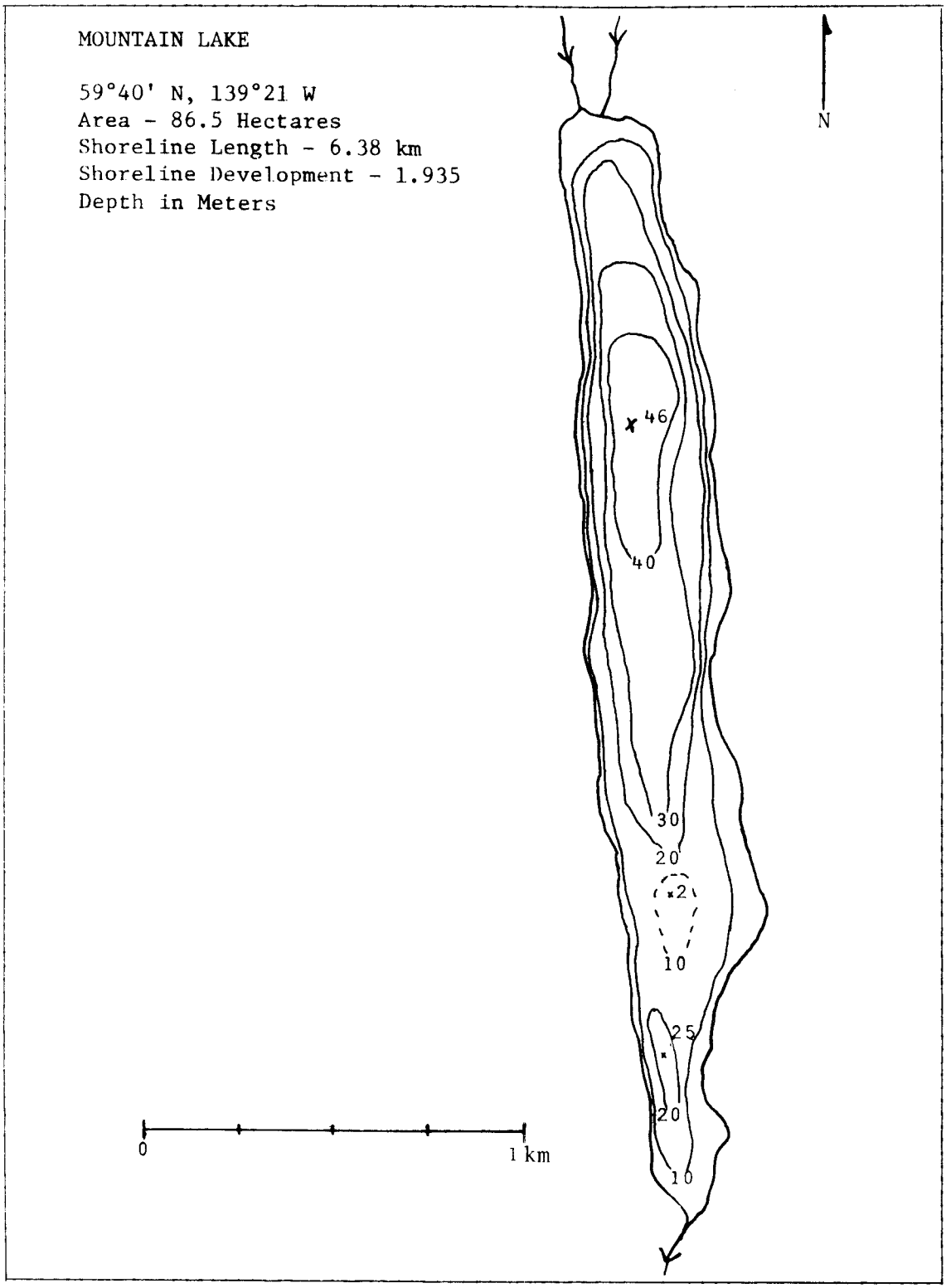

Fig. 3. Bathymetric map of Mountain Lake.

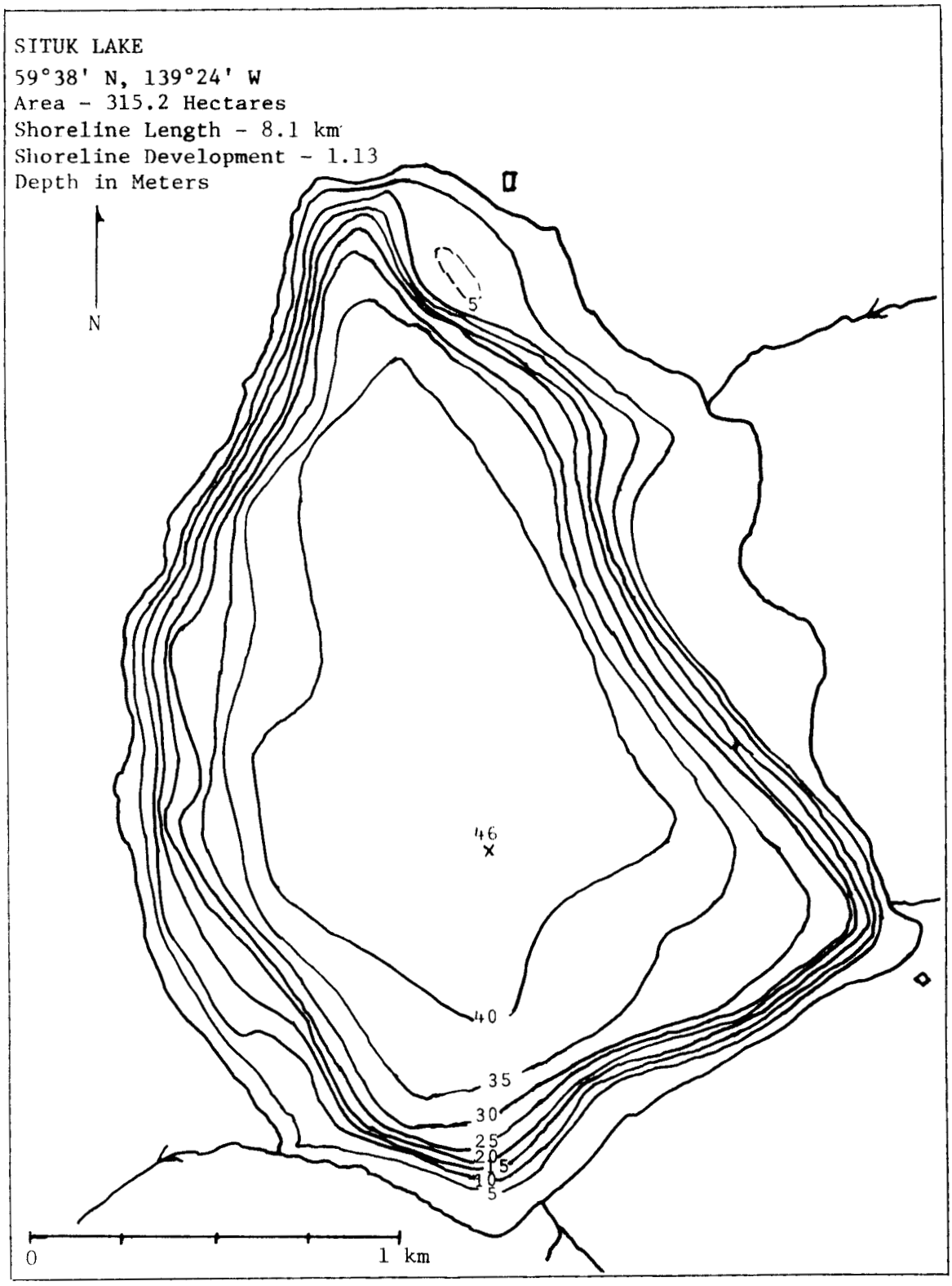

Fig. 4. Bathymetric map of Situk Lake.

Table 2. Morphometry of Akwe Lake.

Water Area 2,156,134 m^2

Area by Depth Zone

Depth Zone (m)	Area (m^2)	Percent of Total Area
0- 20	576,208	26.7
20- 40	349,443	16.2
40- 60	327,137	15.2
60- 80	356,878	16.5
80-100	416,356	19.3
100-120	72,491	3.4
120-137	57,621	2.7

Water Volume 108,094,824 m^3

Volume by Depth Zone

Depth Zone (m)	Volume (m^3)	Percent of Total Volume
0- 20	37,211,595	34.4
20- 40	28,031,392	25.9
40- 60	21,254,204	19.7
60- 80	14,349,441	13.3
80-100	5,092,878	4.7
100-120	1,828,795	1.7
120-137	326,915	0.3

Maximum Depth = 137.0 m

Mean Depth = 50.1 m

Shoreline Length = 7.96 km

Shoreline Development = 1.24

Table 3. Morphometry of Mountain Lake.

Water Area 834,951 m^2

Area by Depth Zone

Depth Zone (m)	Area (m^2)	Percent of Total Area
0-10	192,233	23.0
10-20	260,194	31.2
20-30	148,543	17.8
30-40	158,253	18.9
40-46	75,728	9.1

Water Volume 17,083,160 m^3

Volume by Depth Zone

Depth Zone (m)	Volume (m^3)	Percent of Total Volume
0-10	7,315,637	42.8
10-20	5,087,742	29.8
20-30	3,052,254	17.9
30-40	1,476,071	8.6
40-46	151,456	0.9

Maximum Depth = 46.0 m Mean Depth = 20.5 m

Shoreline Length = 6.38 km Shoreline Development = 1.94

Table 4. Morphometry of Situk Lake.

Water Area 4,080,000 m^2

Area by Depth Zone

Depth Zone (m)	Area (m^2)	Percent of Total Area
0-10	934,320	22.9
10-20	420,240	10.3
20-30	456,960	11.2
30-40	1,073,040	26.3
40+	1,195,440	29.3

Water Volume 111,475,003 m^3

Volume by Depth Zone

Depth Zone (m)	Volume (m^3)	Percent of Total Volume
0-10	37,685,600	33.8
10-20	29,330,501	26.3
20-30	24,934,682	22.4
30-40	17,035,613	15.3
40-46	2,488,607	2.2

Maximum Depth = 46.0 m

Mean Depth = 27.3 m

Shoreline Length = 8.1 km

Shoreline Development = 1.13

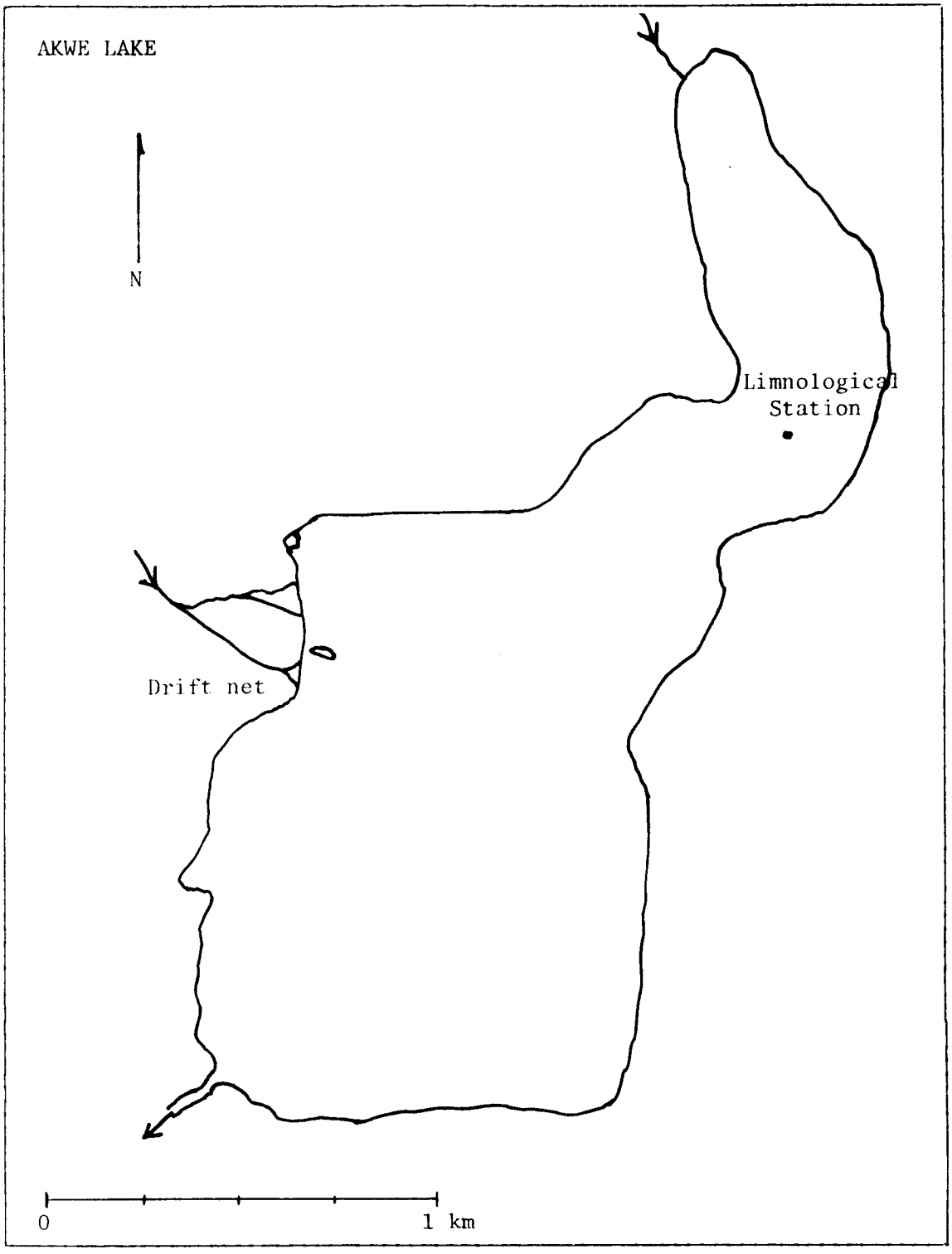

Fig. 5. Map showing location of sampling stations, Akwe Lake, 1980.

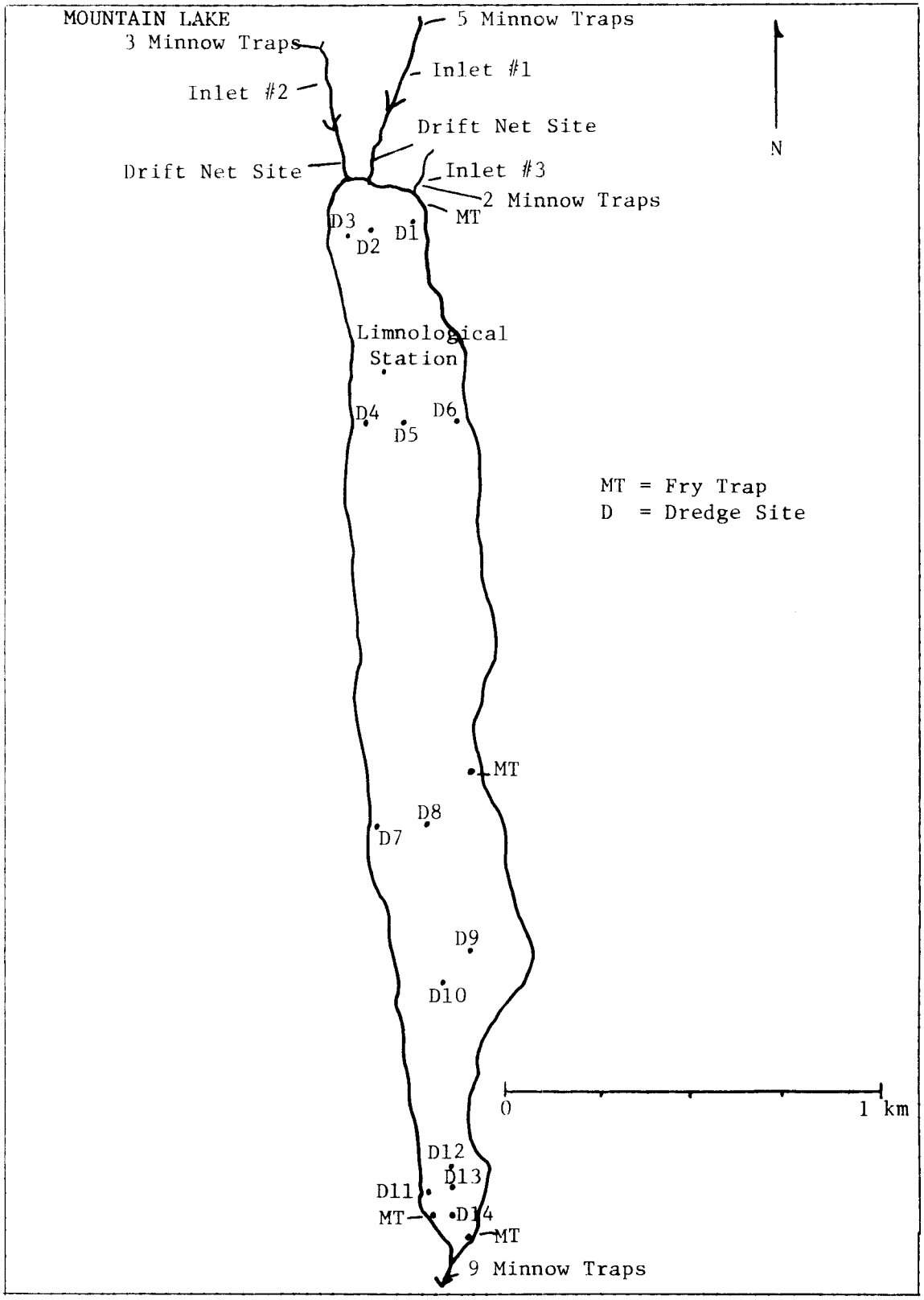

Fig. 6. Map showing location of sampling stations, Mountain Lake, 1980.

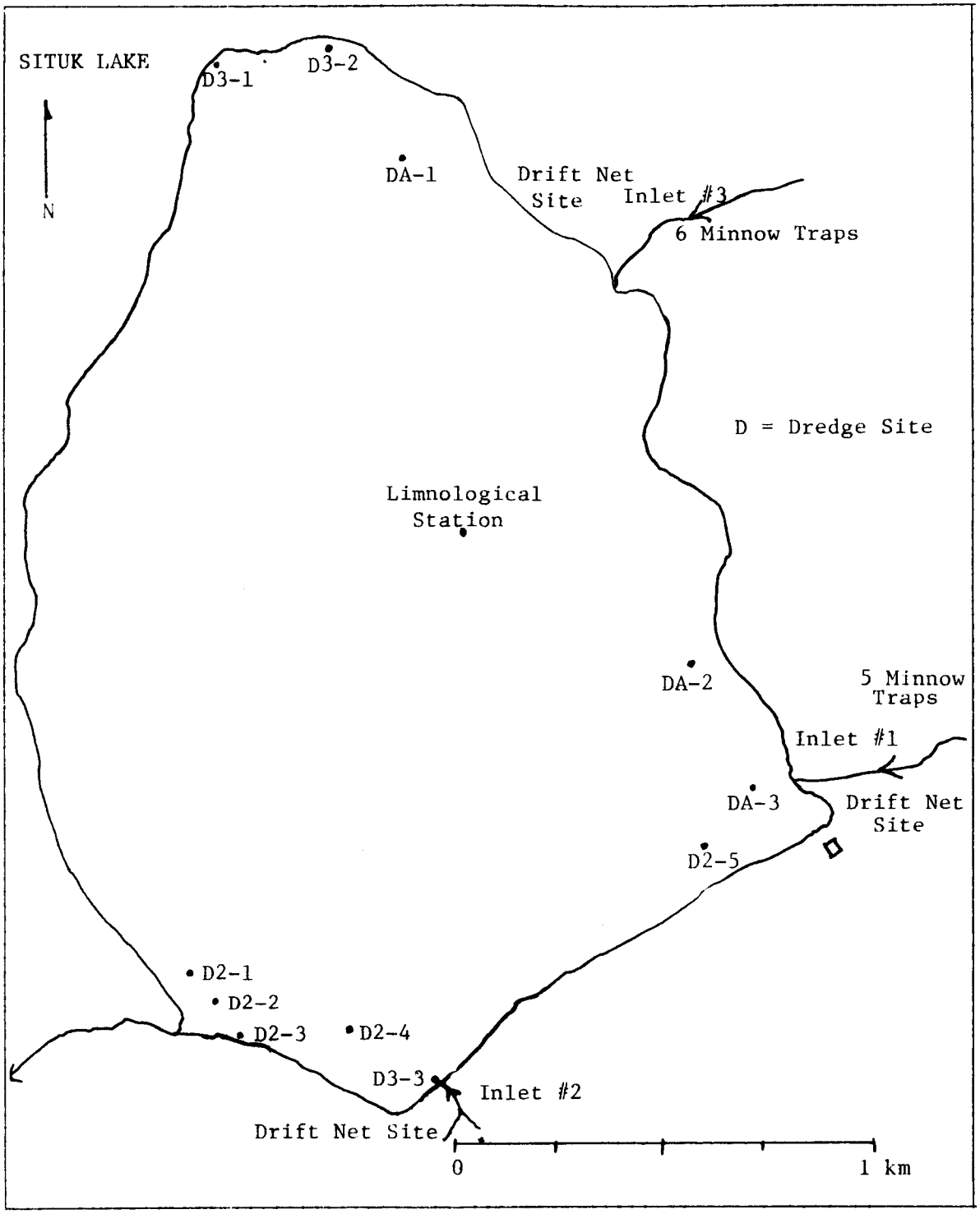

Fig. 7. Map showing location of sampling stations, Situk Lake, 1980.

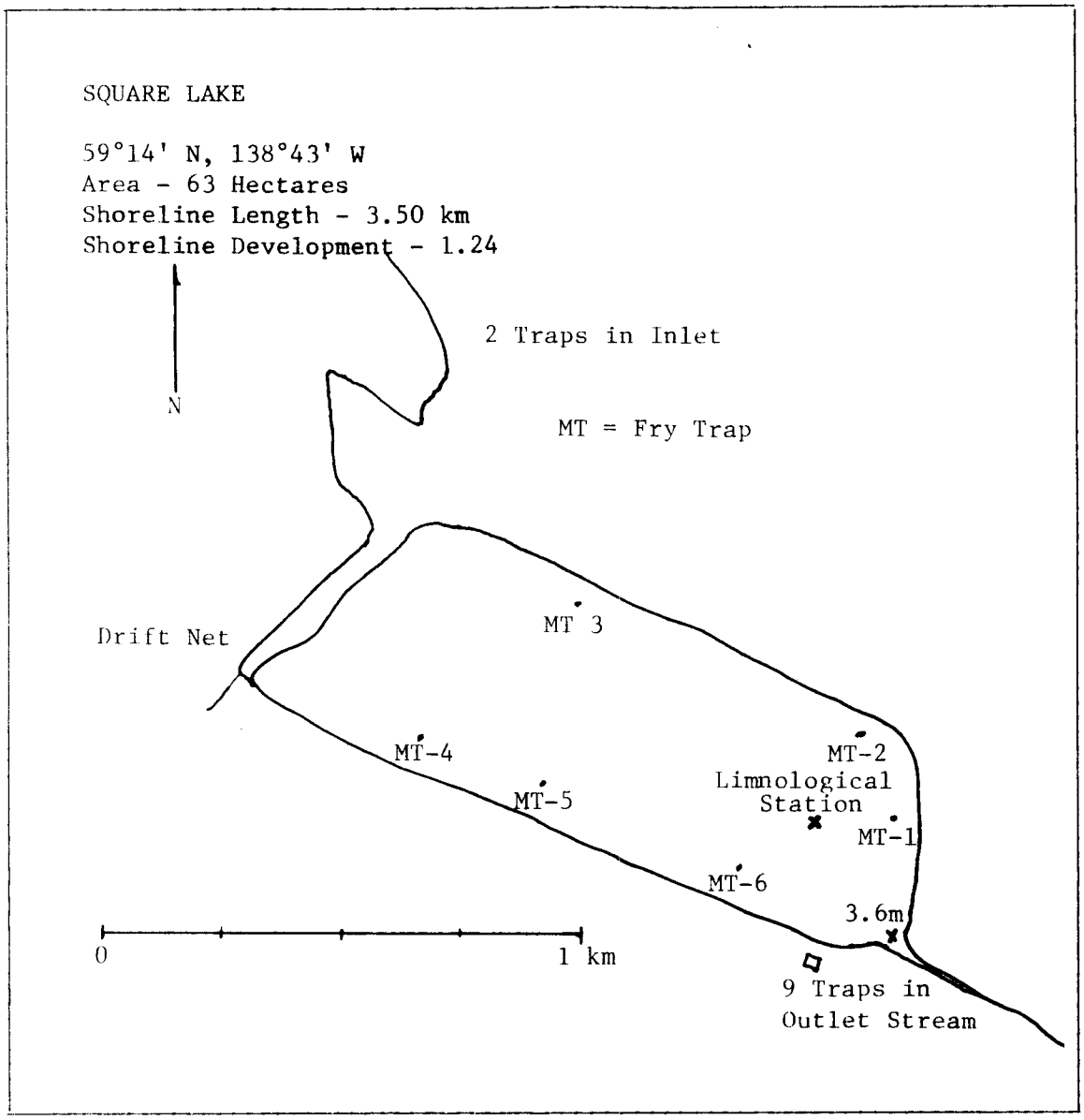

Fig. 8. Map showing location of sampling stations, Square Lake, 1980.

Table 5. Thermal data (°C) from lakes studied, 1980.

Depth (m)	Akwe Lake		Situk Lake				Mountain Lake			
	June 19	Sept. 12	June 4	July 9	Aug. 5	Sept. 12	June 11	July 16	Aug. 11	Sept. 12
S	8.0	8.2	14.5	15.5	14.5	12.0	9.0	12.0	12.0	7.9
1.0	. . .	8.0	. . .	16.0	. . .	11.5	9.0	11.5	. . .	7.9
2.0	. . .	8.0	. . .	15.5	. . .	11.3	9.0	11.0	. . .	7.8
3.0	. . .	8.0	. . .	15.5	. . .	11.2	9.0	10.0	. . .	7.7
4.0	. . .	8.0	. . .	15.5	. . .	11.2	9.0	10.0	. . .	7.2
5.0	. . .	8.0	. . .	14.5	. . .	11.2	8.5	8.5	. . .	7.0
6.0	. . .	8.0	. . .	12.5	. . .	11.2	8.0	8.2	. . .	6.6
7.0	. . .	8.0	. . .	11.5	. . .	11.1	7.5	8.0	. . .	6.5
8.0	. . .	7.8	. . .	10.0	. . .	11.1	7.0	7.8	. . .	6.5
9.0	. . .	7.5	. . .	9.0	. . .	11.1	6.0	7.5	. . .	6.5
10.0	. . .	7.5	. . .	8.2	. . .	11.0	5.5	7.2	. . .	6.5
11.0	. . .	7.2	. . .	7.5	. . .	9.8	5.5	7.0	. . .	6.5
12.0	. . .	7.0	. . .	6.5	. . .	9.2	5.0	7.0	. . .	6.5
13.0	. . .	7.0	. . .	5.8	. . .	7.0	5.0	6.5	. . .	6.5
14.0	. . .	7.0	. . .	5.2	. . .	6.5	4.5	5.8	. . .	6.5
15.0	. . .	7.0	. . .	5.0	. . .	6.0	4.5	5.5	. . .	6.5
Bottom	5.0 (131 m)	. . .	9.0 (21.5 m)	. . .	. . .	. . .	. . .	. . .	. . .	. . .

Table 6. Alkalinity, conductivity, dissolved oxygen, hardness, pH, Secchi disc visibility, and water temperature for lakes studied, 1980.

Lake and Date	Alkalinity (mg/l)	Conductivity (μ mhos)	Dissolved Oxygen (mg/l)	Hardness		pH	Secchi Disc Visibility (m)	Temperature (°C)
				Calcium	Total			
Aka, August 21, 1980	158	. . .	9	66	70	7.5	. . .	15
Akwe, June 18, 1980	20	36	11	. . .	16	7.1	0.5	8
Boat Harbor, August 19, 1980	4	45	5	6	8	6.4	4.0	15
Lake No. 3, August 20, 1980	21	195	. . .	14	29	7.0	4.0	16
Mountain, June 10, 1980	39	75	14	44	46	7.3	6.0	12
Pike, August 18, 1980	5	. . .	11	26	62	6.3	1.5	. . .
Situk, June 3, 1980	46	75	10	44	46	7.3	6.0	10
Square, July 21, 1980	56	128	10	56	60	7.5	3.5	18
Summit, August 20, 1980	99	188	14	94	98	7.5	. . .	15

Table 7. Water quality analyses of Akwe, Mountain, and Situk Lakes, 1980.

Parameter, Unit	Akwe Lake (0.5 m)	Mountain Lake (0.5 m)	Situk Lake (0.5 m)
Specific Conductance, μ mhos	48.0	100.0	105.0
pH	7.1	7.4	7.2
Alkalinity, mg/l	24.0	41.0	49.0
Hardness, mg/l $CaCo_3$	20.4	45.2	48.8
Calcium, mg/l	6.6	15.1	17.1
Magnesium, mg/l	0.7	1.5	1.2
Total Dissolved Solids, mg/l	28.0	59.0	60.0
Total Phosphorus, μg/l as P	Lab Error Not Done	Lab Error Not Done	Lab Error Not Done
Total Filterable Phosphorus, μg/l as P	1.8	2.1	1.9
Filterable Reactive Phosphorus, μg/l as P	1.0	1.2	1.4
Nitrate + Nitrite, μg/l as N	70.7	5.2	100.1
Ammonium, μg/l as N	12.2	13.7	14.3
Reactive Silica, μg/l as Si	546.1	913.1	811.6
Iron, μg/l as Fe	631.7	41.1	40.2

Table 8. Morphoedaphic Index of 25 lakes in southeast Alaska.

Lake	Specific Conductance (μ mhos)	Residue Dissolved Calculated Sum (mg/l)	Surface Area (ha)	$\bar{x}$ Depth (m)	MEI*	Potential Yield** (kg/ha)
Red	93	65***	166	10.4	6.25	2.41
Mountain	100	59	83	20.5	2.88	1.64
Situk	105	60	408	27.3	2.20	1.43
Finger	28	20***	347	10.7	1.87	1.32
Tammy	25	18***	134	10.0	1.80	1.30
Green	39	22	70	12.3	1.79	1.29
Klawak	39	24	1,177	17.7	1.36	1.13
Auke	28	20	46	19.0	1.05	0.99
Virginia	18	13***	258	13.0	1.00	0.97
Manzanita	60	42***	625	49.0	0.86	0.89
Salmon Bay	30	21***	388	26.7	0.79	0.86
Heckman	17	14	163	19.7	0.71	0.81
Spurt	16	14	107	22.2	0.63	0.77
Karta	26	16	508	27.6	0.58	0.74
Akwe	48	28	216	50.1	0.56	0.72
De Boer	13	13	51	23.0	0.56	0.72
Wilson	51	36***	468	54.0	0.67	0.69
Ella	47	33***	710	70.0	0.47	0.66
Patching	17	14	207	30.2	0.46	0.66
Blue	33	22	538	52.0	0.42	0.63
Turner	15	10***	1,270	30.0	0.33	0.55
Osprey	20	14	109	60.0	0.23	0.46
Swan	20	16	208	91.4	0.18	0.41
Lonieof	5	4***	179	55.1	0.07	0.25
Rezanof	3	2***	354	71.2	0.03	0.17

*MEI = Morphoedaphic Index = $\frac{\text{Total Dissolved Solids (TDS)}}{\text{Mean Depth } (\bar{z})}$ (Ryder, 1965)

**Ryder (1965) described the equation $y \sim 2\sqrt{x}$ where y = yield in pounds per acre and mean depth ($\bar{z}$) was in feet. The metric expression (Ryder et al., 1974) is therefore $y \sim 0.966\sqrt{x}$ where yield is fish yield as kg/ha and x = MEI.

***Calculated as 0.70 x specific conductance in micromhos.

Table 9. Plankton composition, density (organisms per square meter), and weight (milligrams per square meter) as collected with No. 153 Nitex plankton net, Akwe, Mountain, and Situk Lakes, 1980.

Lake	Akwe	Mountain			Situk		
Date	June 19	June 11	July 6	August 12	June 4	July 10	August 5
Depth of Tow (m)	30	30	30	30	20	20	20
Cladocera							
Bosminidae	10	4,422	26,515	61,131	13,067	48,904	106,673
Daphnidae	5	1,747	12,761	11,920	2,038	9,475	19,358
Chydorinae	0	423	1,528	1,324	254	5,400	2,751
Cladocera Eggs	10	1,620	12,761	12,226	6,877	23,128	38,410
Copepoda							
Cyclopoida	0	4,712	7,336	6,113	3,388	3,770	1,018
Calanoida	15	0	0	0	0	0	0
Nauplii	0	1,951	2,292	713	1,528	1,324	306
Copepod Eggs	0	0	0	713	0	0	0
Rotifera							
Kellicottia longispina	0	0	13,220	0	764	3,363	2,751
Asplancha sp.	0	509	0	40,040	1,605	21,396	21,701
Keratella sp.	0	0	0	306	178	1,018	1,732
Conochiloides	0	0	0	0	0	1,324	306
Dry Weight	17.8	47.9	100.4	139.6	45.3	102.4	138.0
Organic Weight	8.1	35.2	85.1	120.7	44.3	80.5	117.2
Ash Weight	9.7	12.7	15.3	18.9	1.0	21.9	20.8

Table 10. List of zooplankton species identified by lake, 1980.

Situk Lake	Mountain Lake
Cyclops sp.	*Cyclops* sp.
Bosmina longirostris	*Bosmina longirostris*
Daphnia longiremis	
Alona sp.	

Table 11. Identification and enumeration (organisms per square meter) of benthic organisms from Akwe, Mountain, and Situk Lakes, 1980.

Lake	Akwe	Mountain	Situk
Depth Range	131 m	2-50 m	1-22 m
Number of Samples	1	15	12
Oligochaeta	0	321	212
Planorbidae	0	49	47
Gastropoda	0	6	14
Planariidae	0	3	0
Margaritanidae	0	0	4
Hirudinea	0	0	18
Sphaeroceridae	0	0	445
Amphipoda	0	0	57
Procladius	0	11	54
Aphidae	0	3	0
Curculionidae	0	3	0
Limnephilidae	0	3	0
Natarsia sp.	0	3	4
Protanypus sp.	0	3	22
Cricotopus sp.	0	0	25
Pseudodiamesa sp.	0	40	0
Thienamannimyia sp.	0	3	0
Orthocladinnae sp.	0	3	0
Heterotrissocladius sp.	0	3	0
Dicrotendipes sp.	0	3	2,045
Chironomus sp.	0	135	251
Micropsectra sp.	0	6	29
Stictochironomus sp.	0	146	420
Microtendipes sp.	0	0	11
Phaenopsectra sp.	0	54	0
Polypedilum fallax	0	3	0
Heterotrissocladius sp. A.	0	29	0
Ecclisomyia sp.	0	6	0
Orthoptera	0	0	7
Paraperla	43	0	14

Analysis of stream drift organisms from these lakes (Table 12) shows a wide diversity of species.

Fish:

A summary of fish catch and effort information for lakes studied is presented in Table 13. A discussion of the limnology, fishery, and recreation potential of each lake or lake system follows.

Sport Fishery and Recreation Potential

Situk System:

This aquatic system is comprised of Mountain Lake, Situk Lake, and Situk River (Fig. 1). All portions of the system are accessible to anadromous fish. Each portion of this system is discussed individually although the fish can pass freely throughout the entire system.

Mountain Lake. Mountain Lake is a 86.5-ha lake in the St. Elias mountains 27 km northeast of Yakutat. The lake is 3.1 km long and approximately 0.6 km wide. It is about 46 m deep at its deepest point, but most of the lake is 10-30 m deep. There is one major inlet on the north end and an outlet on the south end (Mountain Stream).

The lake can be reached by floatplane, helicopter, or trail from Situk Lake. There is a good campsite on the west side of the outlet, and the alluvial gravel at the inlet is a good place to camp. Steep slopes on the shores make hiking impractical, so some sort of watercraft is necessary for moving about the lake.

A foot survey of the main inlet indicated highly fluctuating water levels and several areas of slide intrusion into the stream. These actions probably severely limit most spawning and rearing. The second inlet (50 m west of main inlet) is small, short, and probably subject to lack of water in winter. Much of the flow into Mountain Lake seems to be subsurface at the north end of the lake.

Mountain Lake has resident rainbow trout and Dolly Varden. Sockeye, coho, and chum salmon are also present.

Rainbow trout appear to be abundant in Mountain Lake. They are found at the inlet, along the shorelines, and the outlet area. Most of the rainbow trout in the inlet are 200-300 mm and very thin. The rainbows in the outlet area seem to be heavier bodied than inlet area rainbows. Some rainbow trout at the outlet were 400+ mm with the average 300-350 mm. Dolly Varden seem to be concentrated at the inlet with schools of 100-200 seen on occasion. A couple of Dolly Varden were also sampled in the outlet below a falls. The few Dolly Varden sampled at the outlet were similar in size (300-400 mm) to the Dolly Varden in the inlet area.

Age and length of fish sampled are presented in Table 14. Length and weight relationships of rainbow trout and Dolly Varden from Mountain Lake

Table 12. Identification and enumeration of stream drift organisms from Akwe and Situk Rivers and Mountain Stream, 1980.

Lake	Akwe	Situk	Mountain
Date	June 18	June 3-August 7	June 11-August 14
Number of Samples	1	7	6
Salmonidae	0	1	1
Amphipoda	1	1	1
Ostracoda	0	2	0
Oligochaeta	0	0	2
Stylommatophora	0	0	1
Copepoda	0	2	0
Planorbidae	0	1	0
Poduridae	0	0	1
Planariidae	0	0	25
Physidae	0	1	0
Sminthuridae	0	1	0
Beatis bicaudatus	409	124	3,840
B. tricaudatus	0	99	0
Ameletus sp.	1	2	15
Cinygmula sp.	246	31	4
Epeorus sp.	0	4	2
E. deceptivus	7	0	5
E. longimanus	0	5	0
Rhithrogena robusta	1	0	0
Rhyacophila alberta	0	0	10
R. rotunda	0	0	1
R. betteni	0	0	1
R. vaccua	0	0	2
Rhyachophila sp.	0	0	5
Paraleptophlibia sp.	0	0	1
P. debilis	0	4	0
Ephemerella pelosa	0	1	0
Chloroperlidae	17	0	0
Chloroperlinae	0	10	13
Ephemerella coloradensis	0	4	0
E. infrequens	0	40	0
Sweltsa sp.	0	1	0
Capniidae	1	20	1
Isocapnia sp.	0	0	5
Zapoda oregonensis	4	0	3
Z. cinctipes	0	8	0
Podmosta sp.	0	3	6
Taenionema sp.	0	0	2
Despaxia augustus	0	0	1
Paraleuctra sp.	0	0	1
Perlodidae	1	0	0

Table 12. (cont.) Identification and enumeration of stream drift organisms from Akwe and Situk Rivers and Mountain Stream, 1980.

Lake	Akwe	Situk	Mountain
Date	June 18	June 3-August 7	June 11-August 14
Number of Samples	1	7	6
Limnephilidae	2	10	11
Onocosmoecus sp.	5	2	2
Psycoglypha sp.	0	0	1
Lepidoptera	1	3	3
Coleoptera	0	2	3
Staphylinidae	1	1	9
Helophorus	0	0	1
Ichneumonidae	0	0	1
Proctotrophoidea	0	1	2
Dytiscidae	0	2	0
Hydroporus sp.	0	2	0
Illybius sp.	0	1	0
Hymenoptera	2	0	0
Chalcidoidea	0	1	1
Acarina	47	113	38
Aphididae	1	0	2
Poduridae	0	0	1
Hydrophilidae	0	0	1
Cicadellidae	0	0	2
Tipulidae	2	1	2
Tipula sp.	1	0	1
Dicranota sp.	3	0	13
Chironomidae	5	5	14
Pentatomidae	0	0	1
Boleoheptayyini	0	0	3
Diamesini	0	0	115
Diamesa sp.	0	0	670
Natarsia sp.	0	5	0
Arctopelopia sp.	0	1	0
Zaverelimyia sp.	4	1	2
Diamesinae	171	1	0
Pseudodiamesa sp.	23	0	0
Pseudochironomini	0	0	486
Orthocladinnae	96	1	19
Orthocladius sp.	3	2	365
Brillia sp. A.	8	0	8
B. particles	0	0	1
Corynoneura sp.	0	4	2
Cricotopus sp.	0	41	28
Eukielferiella sp.	1	0	15

Table 12. (cont.) Identification and enumeration of stream drift organisms from Akwe and Situk Rivers and Mountain Stream, 1980.

Lake	Akwe	Situk	Mountain
Date	June 18	June 3-August 7	June 11-August 14
Number of Samples	1	7	6
Paraphaenocladius sp.	10	0	5
Rheocricotopus sp.	34	0	38
Krenosmittia sp.	0	9	81
Thienemanniella sp.	0	1	3
Polypedilum fallax	1	4	0
Stictochironomus sp.	1	0	0
Micropsectra sp.	0	4	0
Metriocnemus sp.	0	0	1
Heterotrissocladius sp. A.	0	0	1
Empididae	4	1	7
Bibionidae	23	0	0
Sciaridae	1	0	7
Ceratopogonidae	0	0	4
Cecidomyiidae	0	0	1
Culicidae	0	0	1
Simuliidae	1	1	1
Simulium sp.	0	5	0
Prosimulium sp.	21	20	22
Dixa sp.	0	2	4
Dixidae	0	1	0
Muscoidea	1	0	1
Muscidae	0	1	0
Thysanoptera	0	1	0

Table 13. Summary of fish sampling effort and catch data from lakes studied, 1980.

Date	Location	Gear Type	Total Hours Set	Catch
		Aka Lake		
8/21/80	Near Outlet	2 Fry Traps	4:45	43 TSB
8/21/80	Outlet	Rod and Reel	2:00	11 CT
8/21/80	. . .	Found Dead	. . .	1 DV
		Boat Harbor Lake		
8/19/80	Perimeter	6 Fry Traps	12:35	217 TSB
		Lake No. 3		
8/20/80	Shoreline	3 Fry Traps	4:10	65 TSB
		Mountain Lake		
7/16/80	Throughout	4 Fry Traps	13:00	8 SS Fry
7/15/80	Inlet No. 1	5 Fry Traps	9:20	0
7/17/80	Inlet No. 2	3 Fry Traps	5:30	0
7/16/80	Inlet No. 3	2 Fry Traps	9:35	0
7/17/80	Outlet (Above Falls)	2 Fry Traps	4:35	1 DV, 1 SS Fry
7/17/80	Outlet (Below Falls)	4 Fry Traps	5:30	117 KS (44-77 mm), 67 SS, 6 DV, 3 RT, 1 RS
8/13/80	Outlet (Below Falls)	3 Fry Traps	6:00	52 SS, 2 KS, 1 RS
7/15/80	Inlet	Rod and Reel	1:00	12 DV, 2 RT
7/16/80	Inlet	Rod and Reel	0:20	6 DV, 2 RT
7/17/80	Right Side	Rod and Reel	1:00	8 RT
7/15/80	Outlet	Rod and Reel	2:00	6 RT, 3 DV
8/11/80	Inlet	Rod and Reel	0:25	6 DV, 3 RT
8/12/80	Inlet	Rod and Reel	2:00	8 DV, 3 RT
8/12/80	Outlet	Rod and Reel	3:00	7 RT, 3 DV
		Pike Lake		
8/18/80	Shoreline	6 Fry Traps	14:30	1 NP
8/18/80	Shoreline	6 Fry Traps	3:00	8 NP

Table 13. (cont.) Summary of fish sampling effort and catch data from lakes studied, 1980.

Date	Location	Gear Type	Total Hours Set	Catch
		Situk Lake		
7/08/80	Inlet No. 1, (Lower End)	5 Fry Traps	11:35	23 RB (71-161 mm), 331 SS (41-79 mm), 7 DV (86-195 mm)
7/10/80	Inlet No. 3 to Falls	6 Fry Traps	9:25	227 SS, 18 RT, 6 DV, 6 TSB
7/08/80	Lake (3' Deep Weeds)	1 Fry Trap	2:00	Many TSB
7/08-09/80	Lake	Rod and Reel	6:00	16 RS
7/11/80	Outlet	Rod and Reel	Unknown	12 RT
8/07/80	Outlet	Rod and Reel	Unknown	2 RT
		Situk River		
4/22-24/80	River (Lower End)	Rod and Reel	18:00	23 SH
6/15/80	River (Above Weir)	Rod and Reel	1:30	3 SH
7/19/80	River (Weir)	2 Fry Traps	4:05	27 RT, 24 SS, 2 DV
		Square Lake		
7/21-24/80	Outlet	Rod and Reel	6:00	27 CT
7/24/80	Perimeter	6 Fry Traps	10:40	7 SS, 1 DV (120 mm), 17 TSB
7/23-24/80	Outlet	9 Fry Traps	20:20	1 RT (119 mm), 67 SS (43-107 mm), 2 DV, 54 TSB
7/23/80	Inlet	2 Fry Traps	0:40	11 DV (80-153 mm), 9 SS (49-89 mm)
		Sockeye Creek		
7/19/80	Above Hwy 10	2 Fry Traps	8:30	32 SS, Sc

Table 14. Age and length (mm) relationships* of fish from lakes near Yakutat, Alaska, 1980.

Lake	Situk	Mountain	Situk & Mountain	Square	Pike	Aka	Hart	Square
Species	Rainbow Trout	Rainbow Trout	Dolly Varden	Dolly Varden	Northern Pike	Cutthroat Trout	Cutthroat Trout	Cutthroat Trout
a =	48.59	50.29	-36.29	84.90	212.61	170.15	-29.00	50.66
b =	171.99	138.06	179.42	46.85	116.51	51.19	171.99	157.67
r^2 =	0.89	0.83	0.88	0.93	0.75	0.91	0.75	0.92
N =	33	44	42	10	11	9	9	10
Age								
0	. . .	. . .	. . .	. . .	94	. . .	. . .	. . .
1	49	50	. . .	85	. . .	. . .	. . .	. . .
2	168	146	88	117	. . .	206	. . .	160
3	238	202	161	136	. . .	226	160	224
4	287	242	212	150	374	241	209	269
5	325	272	252	. . .	400	252	248	304
6	357	298	285	. . .	421	262	279	333
7	383	319	313	. . .	439	. . .	. . .	. . .
8	406	337	337	. . .	. . .	. . .	. . .	. . .
9	426	354	358	. . .	. . .	. . .	. . .	. . .
10	445	. . .	377	. . .	. . .	. . .	. . .	. . .
11	. . .	. . .	394	. . .	. . .	. . .	. . .	. . .
12	. . .	. . .	409	. . .	. . .	. . .	. . .	. . .
13	. . .	. . .	423	. . .	. . .	. . .	. . .	. . .

*y = a + b ln x, where y = length (mm) and x = age (years)

are shown in Figures 9 and 10. Stomach content analysis from rainbows and Dolly Varden are presented in Tables 15 and 16.

Fishing at Mountain Lake is very good. Catching 10-15 Dolly Varden and rainbow trout per hour is no problem at the inlet. At the outlet fishing is slower, but the rainbows are somewhat larger. Nymphs work well as do salmon eggs, small spoons, and spinners.

The alluvial fan at the inlet (Figure 11) and shoal areas in the south half of the lake are the major spawning areas for sockeye salmon in Mountain Lake.

Mountain Lake is not very heavily utilized by recreational visitors. Occasionally a floatplane of fishermen stops, and a bear guide takes clients into the outlet area to hunt. The area isn't very scenic, has little area suitable for hiking, and is limited in available sunlight due to high ridges on the east and west sides. The lake seems to get more than its share of rainfall.

Situk Lake. Situk Lake is a 408-ha lake on the Yakutat forelands 21 km northeast of Yakutat.

The lake can be reached by a 8-km long trail starting about 150 m southeast of the Situk River Bridge on Forest Highway 10 out of Yakutat. Also, floatplanes and helicopters can land at the lake.

There are two cabins on the lake. One cabin is maintained by the U.S. Forest Service (USFS) and is located about 100 m south of the main inlet. The other cabin is an old trapping cabin on the north end of the lake. The USFS cabin has a skiff available. Tent camping is probably best along the shore west of the outlet. The USFS cabin has a 4.5°C spring out front, ideal for chilling beverages or keeping food cool.

Situk Lake is fairly shallow and has a high percentage of littoral area compared to most southeast Alaska lakes. This is probably a major reason for the warm temperature and a factor in the productivity of the lake. There are two inlets of significance on Situk Lake, Mountain Stream draining Mountain Lake and Inlet No. 3 on the northeast side of the lake. Inlet No. 3 is short, coming off of a mountain, but the lower part is well used by salmonids.

Situk Lake and River system has resident rainbow trout, Dolly Varden, sculpins, and threespine sticklebacks. Chinook, coho, pink, chum, and sockeye salmon and steelhead trout are also present. Rearing chinook, coho, and sockeye salmon and steelhead trout are found in the system.

Fish numbers in the Situk system are hard to enumerate accurately. Fairly good counts conducted at Situk weir and by walking Mountain Stream and Situk River above the weir and by floating the river below the weir indicate runs of all five species of salmon (see Situk River discussion).

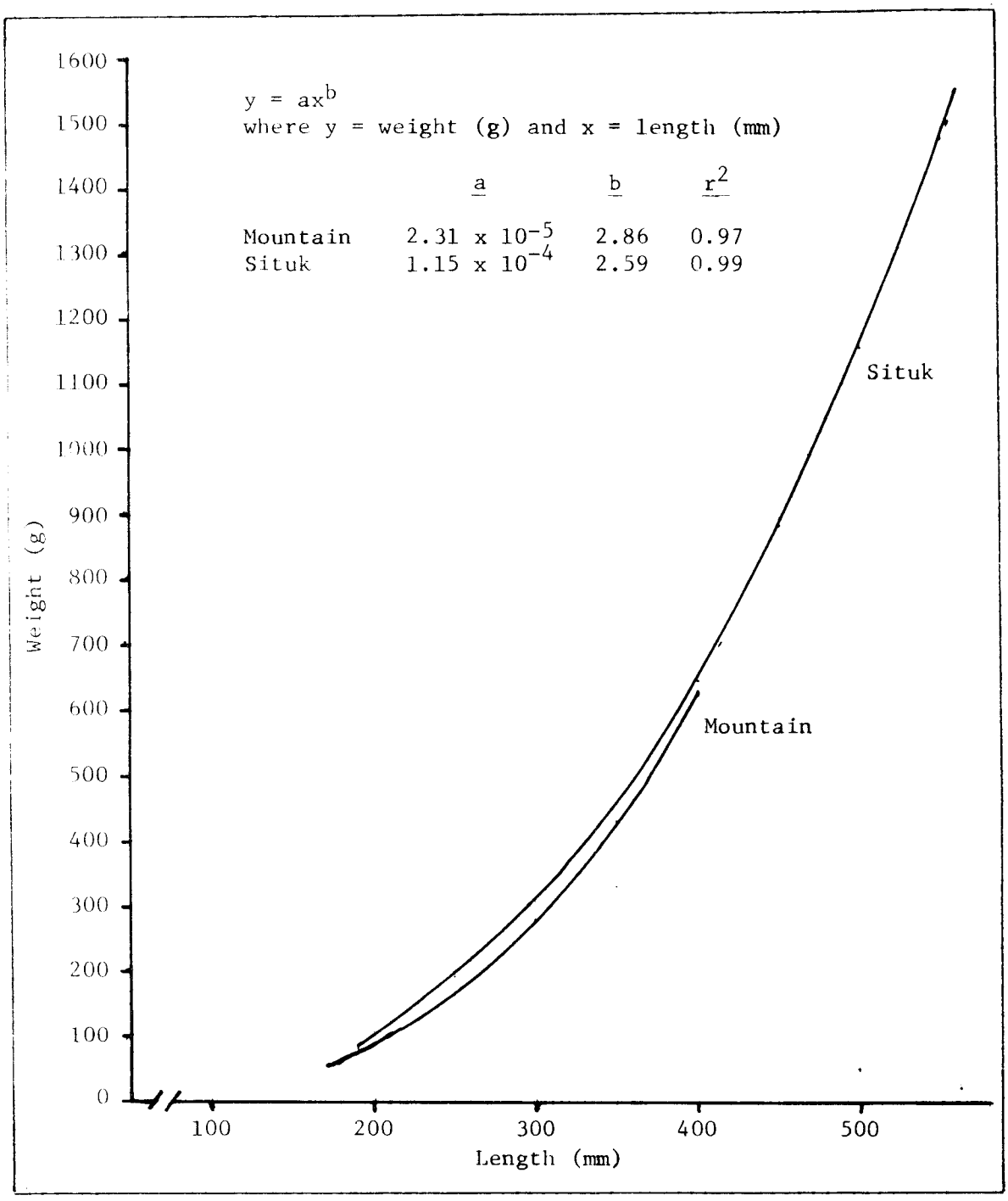

Fig. 9. Length-weight relationship of rainbow trout from Mountain and Situk Lakes, 1980.

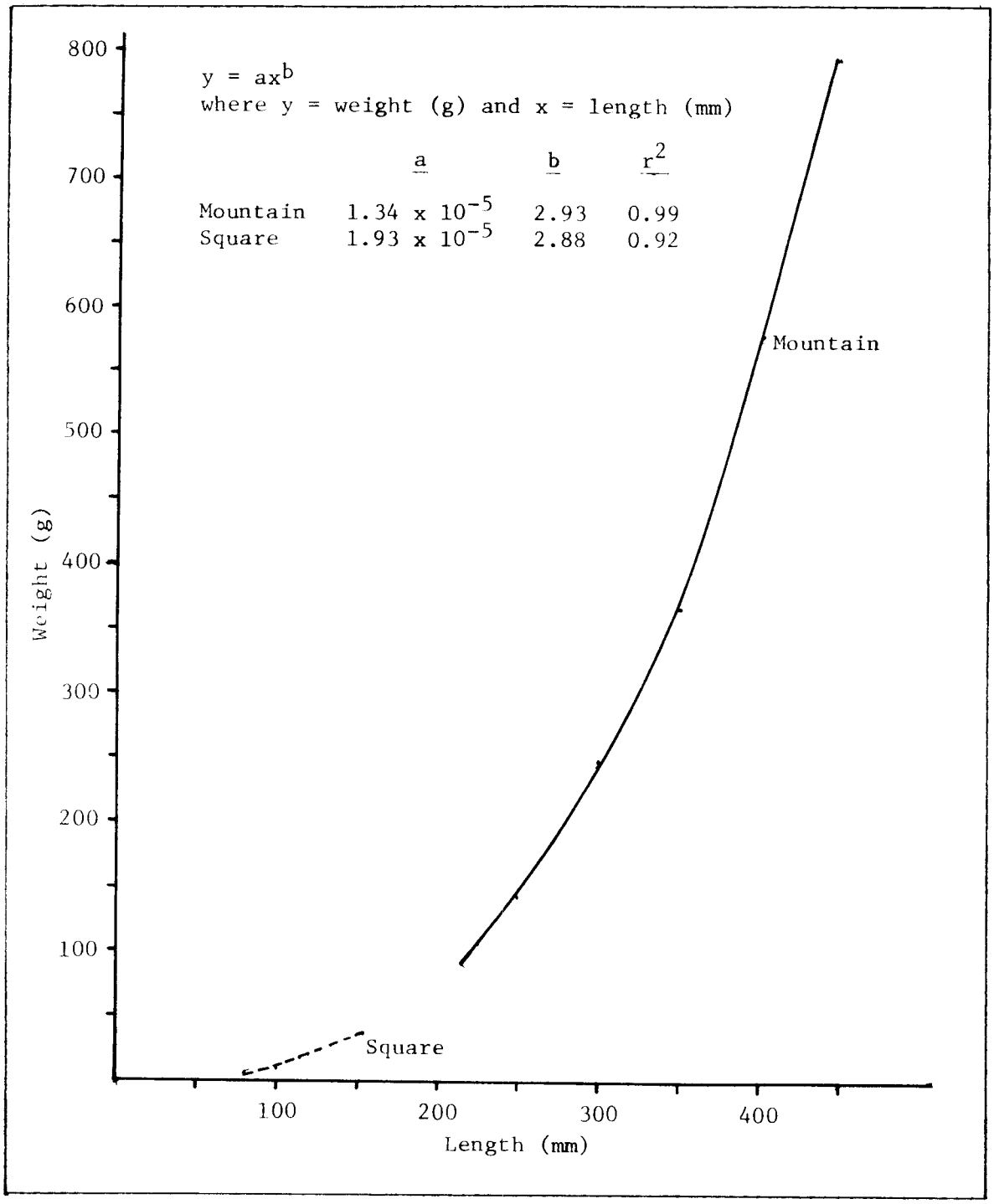

Fig. 10. Length-weight relationship of Dolly Varden from Mountain and Square Lakes, 1980.

Table 15. Stomach contents of rainbow trout, Mountain and Situk Lakes, 1980.

	Mountain Lake Sample Size = 15 3 Empty N = 12 Percent Occurrence	Situk Lake Sample Size = 13 1 Empty N = 12 Percent Occurrence
Nematoda	0	8
Arachnoidea		
Araneae	33	0
Opiliones	8	0
Diptera		
Chironomidae	67	42
Simuliidae	50	92
Ichneumonidae	8	0
Empididae	42	8
Bibionidae	42	0
Muscoidae	8	0
Tipulidae	17	0
Mycetophilidae	17	0
Trichoptera	8	8
Limnephilidae	25	0
Dicosmoecus sp.	0	33
Psychoglypha sp.	8	0
Rhyacophilidae		
Rhyacophila sp.	17	0
Ephemeroptera		
Baetidae		
B. bicaudatus	33	8
Heptageniidae		
Cinygmula sp.	17	0
Siphlonuridae		
Ameletus sp.	17	0
Paraleptophlebiidae	8	0
Coleoptera	42	0
Hydroptilidae	17	0
Scarabaeidae	8	0
Chrysomelidae	33	0
Cantharidae	8	0
Staphylinidae	17	0
Elateridae	8	0

Table 15. (cont.) Stomach contents of rainbow trout, Mountain and Situk Lakes, 1980.

	Mountain Lake Sample Size = 15 3 Empty N = 12 Percent Occurrence	Situk Lake Sample Size = 13 1 Empty N = 12 Percent Occurrence
Homoptera		
Cicadellidae	8	0
Hemiptera		
Corixidae	8	0
Plecoptera		
Nemouridae	8	0
Nemoura sp.	17	0
Zapada sp.	25	0
Chloroperlidae		
Chloroperlinae	25	0
Capniidae	42	0
Perlodidae	8	0
Osteichthyes	33	0

Table 16. Stomach contents of Dolly Varden, Mountain and Situk Lakes, 1980.

	Mountain Lake Sample Size = 18 6 Empty N = 12 Percent Occurrence	Situk Lake Sample Size = 2 N = 2 Percent Occurrence
Nematoda	0	50
Gastropoda	0	50
Planorbidae	0	50
Diptera		
Simuliidae	25	50
Chironomidae	25	0
Trichoptera		
Limnephilidae	8	0
Ecclisomyia sp.	8	0
Psychoglypha sp.	17	0
Ephemeroptera	8	0
Baetidae		
B. bicaudatus	17	0
Homoptera		
Aphididae	8	0
Orthoptera	8	0
Osteichthyes	8	50
Salmonidae	8	0
Eggs	50	50
Rocks	17	0

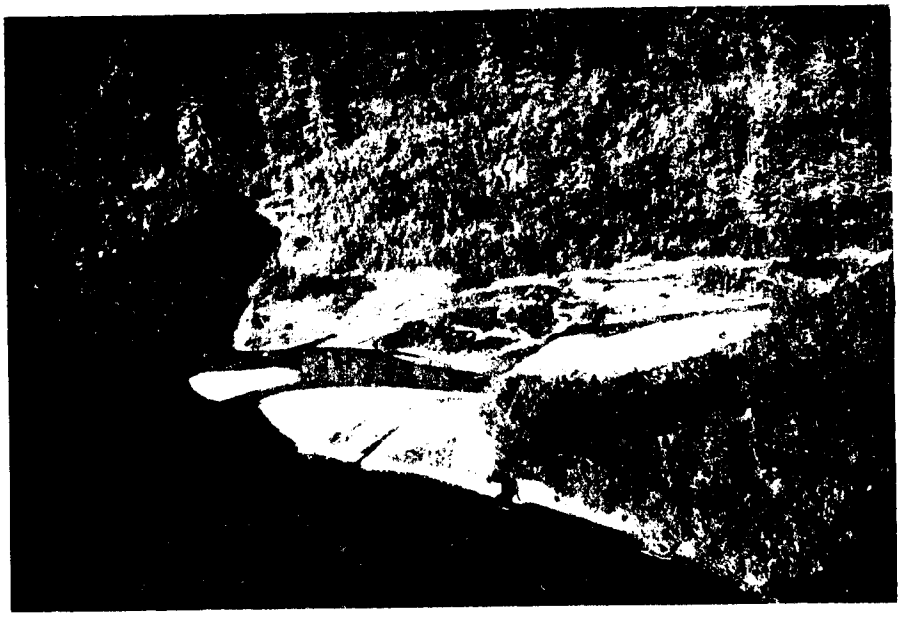

Fig. 11. Mountain Lake inlet, 1980.

The size of resident fish populations in Situk Lake is not known. Only one Dolly Varden was sampled from Situk Lake proper, and no rainbow trout were sampled there. Approximately 200, 200-600 mm rainbows were present in the outlet one afternoon that weren't there 3 hours earlier. We assume these are lake fish that drop into the outlet to feed. Anglers indicated they had good success catching large rainbow trout at Situk Lake outlet. Age analysis indicates that the fish are old and slow growing (Table 14).

Length and weight of rainbow trout from Situk Lake are shown in Figure 9.

Reports from local people indicate that rainbows and Dolly Varden are present at the main inlet at certain times, but none were observed during our surveys. Stomach content of rainbow trout and Dolly Varden from Situk Lake are shown in Tables 15 and 16.

Most of the chinook salmon spawning takes place in Situk River from Situk Lake to the weir. A few chinooks spawn in Mountain Stream and a few below the weir.

The sockeye salmon spawning is concentrated in Situk Lake, Mountain Lake, Situk River at Situk Lake outlet (Figure 12), and Mountain Stream between the two lakes.

Other recreational opportunities available at Situk Lake include animal watching, backpacking, and hunting.

Situk River. Situk River is a medium-size coastal stream flowing 29 km from Situk Lake to the ocean 18 km southeast of Yakutat.

The Situk River is, in terms of fish, the most productive river of its size in southeast Alaska and one of the most popular sport fishing rivers in the state.

The Situk is readily accessible by road at the mouth via Lost River road and at 14-km bridge on Forest Highway 10. Floatplanes can land at Situk Lake, and there is a landing strip about 8 km downstream from 14-km bridge.

Facilities include a USFS cabin at Situk Lake, a USFS cabin at the landing strip, and a cabin 0.8 km above the terminus of the Lost River road. There are two boat launches at 14-km bridge and one at at the terminus of Lost River road. There are numerous undeveloped campsites along the river between the two launches.

The Situk River has runs of all five species of Pacific salmon plus steelhead trout and anadromous Dolly Varden. There are resident rainbow trout and resident Dolly Varden in the river. Sculpins, flounders, and threespine stickleback are also found in the river and eulachon up the old weir site.

There has been a weir on Situk River for enumerating sockeye salmon the past 5 years. The average escapement of sockeye salmon has been 138,000 during this time. There has also been a fairly accurate chinook salmon count. It has averaged about 1,400 fish escapement over the last 5 years.

Fig. 12. Situk Lake outlet, 1980.

Coho salmon escapements have not been accurately counted, and although ground counts from 1966 to present have ranged from 1,400 to 15,000 fish, total escapement may approach 20,000 coho. Pink salmon escapements have varied from 40,000-800,000 over the last 5 years. Chum salmon numbers are only 300-400 fish per year (Alex Brogle, pers. comm.).

The salmon populations on the Situk River, with the exception of pinks and chums, are not threatened, but are at less than historic levels, with major utilization from commercial set fisheries at the mouth. In an attempt to get better allocation for the growing sport fishery on chinooks and cohos, the Sport Fish Division has been gathering sport harvest data.

Recent publicity of the steelhead trout fishery on the Situk has resulted in a steady increase in angling pressure. Total steelhead trout numbers are unknown although float counts of spawners have been made the last six springs at the end of the season in late May. Combined with the upper weir dropout count starting in early June, a minimum run count can be obtained. The steelhead trout are both spring- and fall-run fish, and a better knowledge of run size and spring-run/fall-run composition of the angler harvest, would greatly assist in better management of steelhead trout in Situk River.

Significant steelhead trout spawning takes place between Situk Lake and the weir, but many of the spring fish spawn from the weir down to the tidally influenced portion of the river. Situk River was surveyed by helicopter on June 5 from Situk Lake to the road bridge. Steelhead redds were very abundant in the lower 2 miles, but little evidence of spawning was noted closer to Situk Lake. In 1980, the late May float count of 691 steelhead and weir count of 287 steelhead, indicated a strong run of much smaller fish than seen in 1979.

On June 13 a 310-mm rainbow trout was taken at Situk River weir. The fish was a female ready to spawn and had been digging a redd immediately above the weir.

Akwe Lake:

Akwe Lake is a 215.4-ha lake 60 km southeast of Yakutat in the St. Elias mountains. The lake is a very deep, glacial lake surrounded by mountains on three sides. The outlet end opens onto the Yakutat forelands. The deepest spot is 137 m deep, and most of the lake is over 60 m deep.

Akwe Lake is accessible by floatplane or helicopter. Camping is good near the clearwater inlet on the west side of the lake. There are no cabins on the lake.

There is one major clearwater inlet to Akwe Lake; it is fast and is very cold (5.5°C). There was plenty of good spawning gravel and invertebrates but very little evidence of spawning and no sign of rearing fish in the stream. Angling in and near the clearwater inlet yielded no fish.

Some of the very small inlets had emergent coho and sockeye salmon and sculpin fry in them. There were also a few rearing fish observed feeding along the shore of the lake.

Akwe River is reported to be used by coho and sockeye salmon moving into clearwater tributaries for spawning and rearing. Cutthroat trout are also said to be very numerous in Akwe River where the Ustay River enters it.

The glacial character of the lake, the cold temperature, lack of littoral area, and scarcity of zooplantkon indicate the low productivity.

The lake does, however, have some redeeming qualities. The north end and east sides of the lake have impressive mountains around them. There is a hanging glacier on the north end. The area affords plenty of opportunities to see wildlife. Brown bears, black bears, moose, mountain goats, otters, a beaver, and a wolf were observed during our 3.5-day stay at Akwe Lake. One drawback to the area is the clouds that hang over the lake while the sun is shining on the Yakutat forelands.

Square Lake:

Square Lake is a 63-ha rectangular lake on the Yakutat forelands 67 km southeast of Yakutat. The lake is a small, shallow (4 m) lake with aquatic plants covering the bottom and emergent aquatics along most of the shoreline.

The lake is readily accessible by floatplane, but there were no floatplanes available for charter in Yakutat this year. Helicoptering is an expensive alternative. Cost for going in to and out of the lake was $600 each way for one trip in a Hiller 12E.

There are two cabins at the lake. One is a USFS recreational-use cabin located just west of the outlet. The other cabin is a private hunting cabin about 0.4 km down the outlet. This cabin can also be reached by floatplane.

Square Lake has resident Dolly Varden, rearing coho salmon, threespine sticklebacks, some sockeye salmon, and cutthroat trout. One small rainbow trout was also sampled in the outlet. The size of the sockeye and coho salmon runs into this system are not known.

Square Lake has one major inlet and one outlet. There also are several seepage inlets. The main inlet is low gradient with two active beaver dams on the lower end. The water is very muskeg stained, and the bottom is coated with a reddish mineral precipitate. Minnow trapping and rod and reel sampling revealed Dolly Varden and rearing coho salmon in fair numbers. Threespine sticklebacks were also present.

The outlet seems to be the main holding area for cutthroat trout in the Square Lake system. Cutthroat trout from 155-329 mm were sampled in the outlet with minnow traps and by rod and reel sampling. No small rearing cutthroats were observed in the Square Lake system. Length and weight

relationship of cutthroat trout and stomach contents from cutthroats are presented in Figure 13 and Table 17, respectively. One rainbow trout of 91 mm was minnow trapped in the outlet. A few Dolly Varden were also collected in the outlet. There doesn't seem to be a large population of catchable-size fish in the system.

Most of the fishing pressure on Square Lake is incidental to moose hunting and this amounts to little. The USFS cabin has not been rented since 1978, and judging from its condition the private cabin has not been used since 1978.

Some waterfowl hunting has also been done by moose hunters in the Square Lake area, judging from silhouette decoys found in the private cabin.

There doesn't seem to be too many other opportunities for outdoor recreational pursuits at Square Lake. The forelands around Square Lake are not conducive to hiking or other recreation.

Aka Lake:

Aka Lake is the most westerly of the Summit Lake chain about 4.5 km southwest of Yakutat. Aka Lake is a shallow (3 m), weedy lake with no visible inlets and one small outlet draining into the Ankau salt chuck.

Aka Lake is readily accessible by road from Yakutat, and a small boat or canoe can be launched easily on the west side of the lake. The lake has no camping facilities on it.

Aka Lake has cutthroat trout, Dolly Varden, coho salmon, threespine sticklebacks, sculpins, and possibly some sockeye salmon in it although none were observed.

The population of cutthroat trout in Aka Lake is not very large. We only found them in the outlet and it is very small (1.5 m wide and 0.5 m deep in much of its length). One Dolly Varden was sampled and it was found dead in the lake. A few rearing coho salmon were observed in the lake but none were trapped. The outlet had good numbers of rearing cohos.

The cutthroat trout sampled in Aka Lake outlet averaged 200-250 mm in length and were healthy-looking fish. Two fish just over 300 mm were sampled, and several 150-200-mm cutthroats were observed. Length, weight, and stomach content of cutthroat trout are presented in Figure 13 and Table 17.

Fishing pressure in Aka Lake is light. People who fish the lake report good numbers of sea-run cutthroat trout in spring and fall.

Other recreational activities pursued at Aka Lake are limited. I heard of a few people hunting ducks on the lake. The lake is not scenic. Although it has a nice sand bottom along much of the shoreline, leeches and a heavy weed carpet over much of the bottom would deter most swimmers.

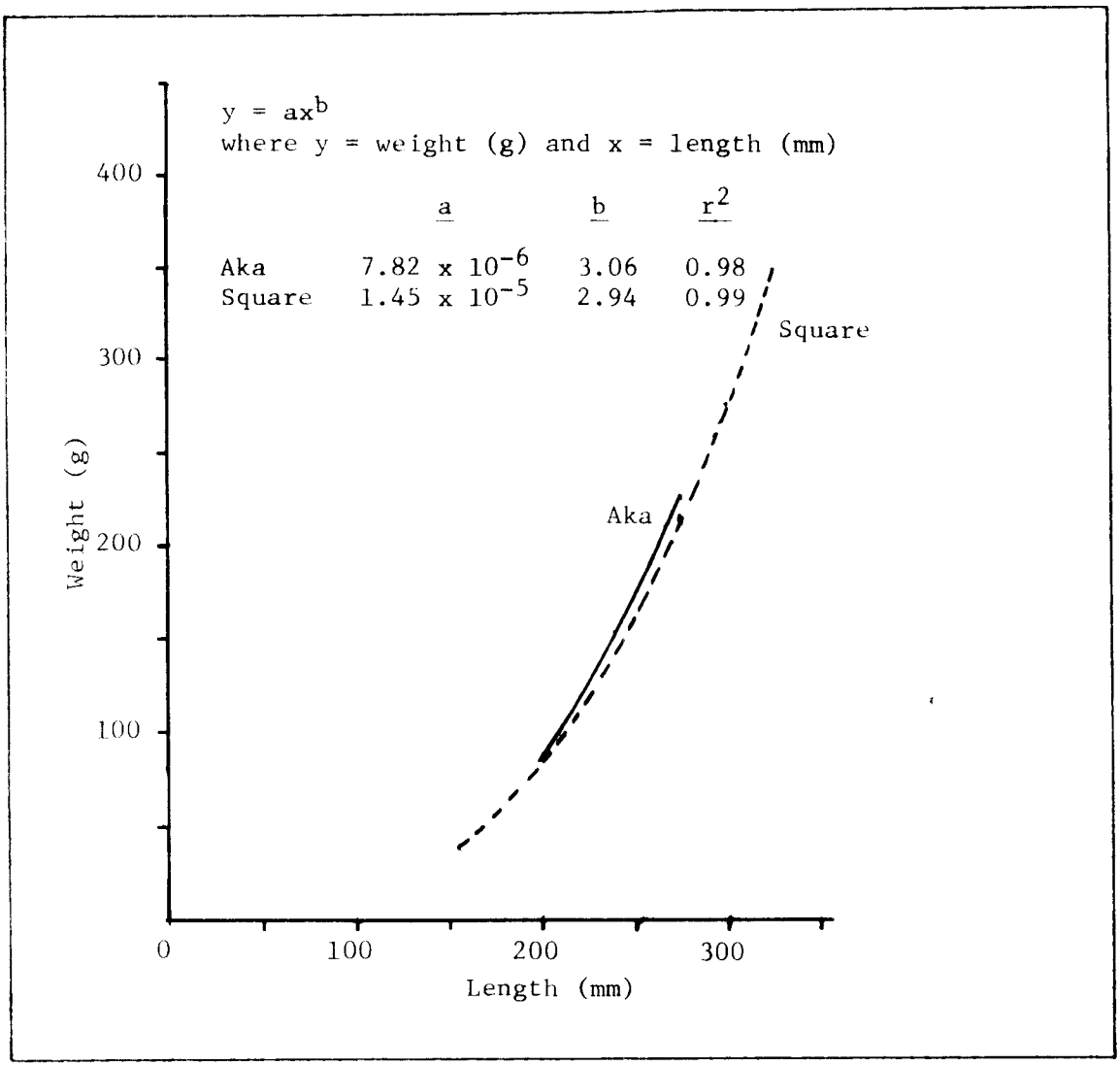

Fig. 13. Length-weight relationship of cutthroat trout from Aka and Square Lakes, 1980.

Table 17. Stomach contents of cutthroat trout, Aka, Hart, and Square Lakes, 1980.

	Aka Lake Sample Size = 9 N = 9 Percent Occurrence	Hart Lake Sample Size = 9 N = 9 Percent Occurrence	Square Lake Sample Size = 10 1 Empty N = 9 Percent Occurrence
Hyrudinea	0	0	11
Gastropoda	0	33	0
Diptera Chironomidae	0	67	0
Trichoptera	0	11	0
Ephemeroptera	0	0	11
Coleoptera	0	0	22
Osteichthyes Gasterosteidae	100	0	67
Amphibia Bufonidae	0	0	44
Mammalia Soricidae	0	11	0

Summit Lake:

Summit Lake is the most easterly of the Summit Lakes 4.5 km southwest of Yakutat. It is a very shallow (1.5 m), small lake with a weed mat within 1 m of the surface over 95% of the lake.

There are no facilities at Summit Lake, but it is easily reached by road from Yakutat.

There are sockeye, coho, chum, and pink salmon utilizing the Summit Lake drainage. There are cutthroat trout and Dolly Varden in Tawah Creek below Summit Lake, and they probably utilize Summit Lake to some extent. Threespine sticklebacks were also observed in Summit Lake.

Several hundred sockeye salmon spawn in Ophir Creek (the inlet to Summit Lake). Also a couple hundred coho salmon spawn there. Pink and chum salmon numbers are very low. No cutthroat trout or Dolly Varden were sampled during the survey.

The only known utilization of Summit Lake by recreational users is for duck hunting.

Lake No. 3:

Lake No. 3 is a two-part lake 4.5 km southwest of Yakutat. It is just south of Kardy Lake. The lake is shown as two separate lakes on maps; but possibly due to the 1964 earthquake, it is now one lake.

The lake is easily reached by road, and there are no facilities there.

The only fish species observed or sampled in Lake No. 3 were threespine sticklebacks. They were quite numerous but didn't trap well.

One small trickle inlet was noted, but there was no spawning gravel in it. There was no visible outlet.

Lake No. 3 is a nice little lake to paddle a canoe around on, but I don't think it gets any recreational use.

Boat Harbor Lake:

Boat Harbor Lake is a small lake just to the right of the road from the boat harbor to the marina in Yakutat.

A small boat or canoe could easily be launched in the lake.

There are a couple trickle inlets to the lake but no outlets.

Presently, the lake is heavily populated with threespine sticklebacks. No other species of fish were observed.

The lake is up to 8 m deep, slightly acidic, and has a good supply of food for a limited cutthroat trout fishery. There is no spawning habitat for cutthroats, however.

Pike Lake:

Pike Lake is one of a group of lakes on the Antler River drainage about 32 km southeast of Yakutat on the Yakutat forelands. It is a small lake and only about 4 m deep maximum.

It is easily reached by a 0.4-km hike across a muskeg to the lake from 40 km on Forest Highway 10. There are no facilities at Pike Lake, and most fishing is done by day trippers.

Pike Lake seems to have only northern pike in the lake itself. One northern pike caught a short distance down the outlet had two Dolly Varden in its stomach. The lake is open to anadromous fish, but the northern pike must prevent them from utilizing the lake and inlet areas for rearing. It is not known how far down the outlet the northern pike are found. There are a lot of northern pike in Pike Lake. Two hours of rod and reel angling produced eight northern pike from 360-457 mm in length. On a second trip into the lake I observed a northern pike of 650-700 mm in length. Also, young-of-the-year northern pike were very plentiful in the weeds along shore. Sampling in the deeper water away from shore failed to produce any fish.

The northern pike found in Pike Lake were all very thin. Their main food sources are probably insects and smaller northern pike. One northern pike approximately 400 mm long had six annuli, which is poor growth for northern pike.

Pike Lake receives only light fishing pressure. Most people who do fish Pike Lake just want the novelty of catching a northern pike. Bank angling is restricted by a wide ring of nuphar around the lake.

The Pike Lake area has some nice qualities about it. There are many fairly dry muskegs in the area which make for good hiking. Lodgepole pine is found in the immediate area (the only place it is found on the Yakutat forelands). There also seems to be a healthy moose population in the area. Three moose were seen during the second lake survey.

Another of the pike lakes was also surveyed on the second trip into the area. It is about 1.6 km north of Pike Lake and seems to have a stunted population of northern pike. Three fish were sampled there, and numerous young-of-the-year northern pike were observed along the shoreline.

According to Dinneford (1975) one of the pike lakes contains northern pike as large as 12 pounds. These lakes are unique in southeast Alaska and warrant further study.

Hart Lake:

Hart Lake is located southeast of Yakutat in the Deception Hills. This is now included in Glacier Bay National Monument. The lake is large enough for access by floatplane, if lightly loaded. A private cabin exists on the lake.

Cutthroat trout were the only fish sampled from the lake. Nine cutthroat trout (129-291 mm) were caught in 45 minutes angling time. Stomach content of these fish is presented in Table 17. Cutthroats as large as 350 mm were seen in the lake. Rearing fish were seen in the inlet below a beaver dam.

The lake appears to be deep with little shallow area. The inlet is at the east end of the lake. The outlet is small and probably has a barrier falls.

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